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1. [ST13B-001: Advanced Tools for Mammalian Genome Engineering](#)

Release Date: 07-26-2013 Open Date: 08-26-2013 Due Date: 09-25-2013 Close Date: 09-25-2013

OBJECTIVE: Improve the utility of Human Artificial Chromosomes (HACs) by developing new selectable metabolic markers for use in human cells, new high-fidelity methods for inserting DNA constructs of at least 50,000 base pairs (bp) in length into defined genomic loci, and new methodologies for facile intercellular genome transplantation. DESCRIPTION: The ability to deliver exogenous DNA to mamma ...

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2. [ST13B-002: Quantum Dot Mid-Wave Infrared Focal Plane Array](#)

Release Date: 07-26-2013 Open Date: 08-26-2013 Due Date: 09-25-2013 Close Date: 09-25-2013

OBJECTIVE: Develop a mid-wave infrared (MWIR) focal plan array (FPA) using quantum dots for next-generation night vision. DESCRIPTION: Historically, night vision has provided the United States Armed Forces with an asymmetric tactical advantage in combat operations. However, the tradeoffs of low sensitivity (microbolometers), high power consumption (active cooling), or specialized consumables (...

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3. [ST13B-003: Multiferroic Materials for RF Applications](#)

Release Date: 07-26-2013 Open Date: 08-26-2013 Due Date: 09-25-2013 Close Date: 09-25-2013

OBJECTIVE: Demonstrate RF/microwave devices, components, and circuits based on multiferroic composite structures. Design discrete devices for radio and radar with a new tunability feature that adds to the performance over conventional RF/microwave components by leveraging the voltage-tunable frequency response of multiferroics. Demonstrate voltage tunable devices with performance equal to or bet ...

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4. [ST13B-004: Data-Parallel Analytics on Graphics Processing Units \(GPUs\)](#)

Release Date: 07-26-2013 Open Date: 08-26-2013 Due Date: 09-25-2013 Close Date: 09-25-2013

OBJECTIVE: Explore the space of data-centric problems and algorithms that lend themselves to high-performance implementation on GPUs; develop a high-level language for easy programming of GPUs; and develop a product that can support real-time, quantitative analysis of a wide variety of data using the cost and energy efficient compute capabilities of GPUs and other relevant many core architectures. ...

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5. [ST13A-001: Functional Imaging to Develop Outstanding Service-Dogs \(FIDOS\)](#)

Release Date: 01-25-2013Open Date: 02-25-2013Due Date: 03-27-2013Close Date: 03-27-2013

OBJECTIVE: This effort will capitalize on first-of-its-kind neural imaging feasibility work; demonstrating functional brain activation in unrestrained dogs in response to handler cues. The objective of this effort is two-fold; first, to optimize the selection of ideal service dogs, both in operational military and therapy environments, and second, to use real-time neural feedback to optimize canine training, shortening training duration, reducing costs, and increasing learned responses.

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6. [ST13A-002: High-bandwidth, Low-sensitivity Optomechanical MEMS Accelerometers](#)

Release Date: 01-25-2013Open Date: 02-25-2013Due Date: 03-27-2013Close Date: 03-27-2013

OBJECTIVE: Develop a chip-integrated optomechanical micro-electromechanical systems (MEMS) accelerometer with 100 ng/Hz^{1/2} sensitivity and 10 kHz bandwidth using high finesse optics to readout and dynamically tune sensor parameters. DESCRIPTION: Inertial navigation systems (INS) are a critical asset to the DoD in environments where GPS is either denied or unavailable. At the heart of these systems are precision acceleration and rotation sensors. Recently, MEMS-based accelerometers have found widespread use in INS owing to their small size and ease of fabrication.

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7. [ST13A-003: Development of Gravitational Radiation Technology for Military Applications](#)

Release Date: 01-25-2013Open Date: 02-25-2013Due Date: 03-27-2013Close Date: 03-27-2013

OBJECTIVE: Demonstrate key technologies to enable application of gravitational radiation theory and research to military communications and navigation. DESCRIPTION: There is a need for world-wide communications and navigation systems which do not need a sky-view link or line-of-sight and which are less vulnerable to threat activity. Satellite communication and navigation systems are vulnerable to interdiction and are expensive to maintain and operate. One, very high risk approach is the adaptation of gravitational radiation (GR) to communications.

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8. [ST13A-004: A Flexible and Extensible Solution to Incorporating New RF Devices and Capabilities into EW/ ISR Networks](#)

Release Date: 01-25-2013Open Date: 02-25-2013Due Date: 03-27-2013Close Date: 03-27-2013

OBJECTIVE: Develop a representation with formal semantics for the static and dynamic

characteristics of Radio Frequency (RF) devices. DESCRIPTION: In military applications, RF devices constitute a heterogeneous network of receivers/transmitters deployed primarily for the purpose of communicating tactical information. However, current RF devices are highly versatile and have the potential of fulfilling various functions in support of various tasks such as Situational Awareness, Electronic Warfare/Intelligence, Surveillance and Reconnaissance (EW/ISR).

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[9. ST13A-005: Modeling and Optimizing Turbines for Unsteady Flow](#)

Release Date: 01-25-2013 Open Date: 02-25-2013 Due Date: 03-27-2013 Close Date: 03-27-2013

OBJECTIVE: Develop an analytical software tool capable of modeling and optimizing turbine components for unsteady flow conditions. DESCRIPTION: Conventional gas turbine engines rely on Constant Pressure Combustion (CPC) to generate the enthalpy needed to provide the horsepower and thrust that our warfighters need. Unfortunately, CPC is a very inefficient process and approximately 30-40% of the energy contained in a unit of fuel is wasted.

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[10. ST13A-006: Novel Extensible Design Approaches for Advanced Aircraft Composite Structural Architectures](#)

Release Date: 01-25-2013 Open Date: 02-25-2013 Due Date: 03-27-2013 Close Date: 03-27-2013

OBJECTIVE: Define a low-level stochastically verified composite structural toolset geared towards expediting aircraft design and development, while at the same time leveraging building-block approach to structural verification for enhanced airframe assurance. DESCRIPTION: Advanced composite structures enable high performance aerospace structures, including extensive tailoring to particular applications, fastener elimination, weight reduction, improvements in fatigue resistance, and corrosion prevention.

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